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BRIEF PRESENTATION OF THE UNIDO-CZECHOSLOVAKIA JOINT PROGRAMME FOR INTERNATIONAL CO-OPERATION IN THE FIELD OF CERAMICS, BUILDING MATERIALS AND NON-METALLIC MINTERALS BASED INDUSTRIES*

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I. INTRODUCTION

During its six years of existence, the UNIDO-Czechoslovakia Joint Programme has gained a good reputation within developing countries due to its rapidly increasing activities in the field of ceramics, building materials and non-metallic minerals based industries.

UNIDO is faced with the challenge to assist developing countries to attain their industrial objective agreed on at the Second General Conference held at Lima in 1975 to raise their share in global industrial output to at least 25 per cent by the year 2000. A great significance is attached to the development of the building materials and construction industries sector within the overall UNIDO programme because of its importance to the industrial and infrastructural development.

The activities of the Joint Programme, which has assisted developing countries in the wide field embracing ceramics, building materials, glass and application of non-metallic minerals in industries, agriculture and environmental protection focus particularly on the industrial exploitation of local raw materials. Backed by a strong network of industries and research facilities, the Joint Programme has developed a prompt system of testing and evaluating raw materials, developing processing technologies, training technicians, assisting industries and providing technical information.

II. BACKGROUND AND OBJECTIVES

On 20 September 1978, a Memorandum of Understanding was signed between the United Nations Industrial Development Organization and the Government of the Czechoslovak Socialist Republic establishing the UNIDO-CSSR Joint Programme for International Co-operation in the Field of Ceramics, Building Materials and Non-metallic Minerals based Industries. The Joint Programme with its office based in Pilsen commenced its activities on 1 October 1978.

The establishment and orientation of the Joint Programme are in conformity with the conclusions of the Second General Conference of UNIDO, held in Lima in March 1975, and the Third General Conference of UNIDO which took place in New Delhi in January 1980.

The UNIDO-CSSR Joint Programme was established at the Research Institute for Ceramics, Refractories and Raw Materials and it has been backed by the companies associated under the Czechoslovak Ceramic Works, producing a very wide range of non-metallic minerals and ceramic articles totalling about 14,000 different products. It has also been maintaining close contacts with glass, cement, lime, building materials and non-metallic minerals based industries. It has taken advantage of the great Czechokosvak tradition, extensive experience and developed educational system related to the non-metallic industries.

In keeping with the Memorandum of Understanding, the Joint Programme has provided assistance to developing countries in fostering of twinning arrangements between the appropriate Czechoslovak organizations and similar ones in the developing countries, in carrying out individual training of technicains and engineers as well as group training programmes and workshops, in the testing of raw materials together with the related technological research and pilot investigations leading to the selection of appropriate industrial technology, Its staff has carried out exploratory and advisory missions in the relevant technical fields covering such topical issues as energy conservation and is now also concerned with the utilization of non-metallic minerals for soil conditioning and for environmental protection. Special attention is being paid to the Industrial Development Decade for Africa in which the Joint Programme is expected to play a significant role.

III. SIX YEARS OF ACTIVITY

Since 1978 the Joint Programme has been engaged in a wide range of activities of which some examples are quoted in the following paragraphs. As a result, the knowledge about the services available through the Joint Programme is rapidly spreading and the number of high-level officials visiting the Joint Programme office in Pilsen to obtain a first hand-impression of the potential for co-operation is increasing year by year.

Training

The training programme has focused on technological questions related to the various phases of the non-metallic materials flow from the extraction over beneficiation and manufacture to the final application of the products and special attention has been paid to the conservation and management of energy in the silicate industries. All trainees, individual fellows as well as participants in technical workshops, were introduced to the latest technical developments in Czechoslovakia and given the possibility to discuss and seek solutions to their individual technological problems.

The Technical Workshop on the Exploitation and Beneficiation of Non-metallic Minerals, the Technical Workshop on Energy Conservation in Silicate Industries for the Least Developed Countries, and the In-plant Technical Workshop on Energy Conservation and Management in Ceramic Industries organized by the Joint Programme dealt with a broad variety of issues related to the non-metallic raw materials based industries. They were attended by participants representing a total of 23 developing countries.

In addition to the group training participants a total of twenty specialists from different countries followed individually tailored training programmes arranged by the Joint Programme covering such subjects as special laboratory control methods, industrial and agricultural uses of non-metallics, ceramic and refractory production technologies and energy conservation in ceramics.

Exploitation of Local Raw Materials

Effective exploitation of local raw materials requires detailed knowledge about their qualities and possible applications. The products based on non-metallic minerals are today applied in a multitude of heavy and light industries including first and foremost the construction industry and are thus indispensable to the balanced development of any national economy.

In total, 45 reports on raw material tests carried out by the Joint Programme and providing an evaluation of their industrial potential were elaborated for 22 countries. In most cases, the preliminary, laboratory and pilot tests involved technlogical research leading to proposals of processing technologies. The following table illustrates the broad range of technologies covered:

Sector	Raw Material Tested
Ceramics	Clays, kaolins, feldspars, limestones, graphite
Structural ceramics	Brick clays, stoneware clays, kaolins, slags
Glass	Glass sands
Paper and rubber	kaolin (coating and filling kaolins)
Agriculture	Diatomaceous earth, bentonite, perlite
Foundries	Bentonites
Refractories and insulating materials	Kyanites, silica, clays, kaolins, graphite, vermiculite, diatomaceous earth
Cement and lime	Pozzolanas, limestone, gypsum
Sintering materials	Diatomaceous earth, perlite
Protection of environment	Perlite, bentonite

The system of raw materials testing has demonstrated its usefulness as a catalyst for further co-operation. In the case of Suriname, for instance, work started by orientation tests of raw materials and went on to pilot verification tests and elaboration of ceramic technologies including a pre-feasibility study for a wall and floor tile manufacture. Further technical assistance to the ceramic industries in Suriname was provided, technicians were trained in the Joint Programme and project proposals for a twinning arrangement and long-term technical assistance elaborated.

Transfer of Technical Knowledge

The Joint Programme, taking advantage of the wide know-how of Czechoslovak ceramic industries, has extended direct assistance to the developing countries in all phases of industrial exploitation of non-metallic raw materials. Participating in UNIDO operational projects, the experts of the Joint Programme have visited Brazil, Guyana, India, Libya, the Philippines, the Seychelles, Suriname and Zimbabwe and assisted governmental authorities and industrial enterprises.

A large number of project proposals have been elaborated covering possible future technical assistance based on the considerable experience of the Joint Programme in its areas of responsibility.

During its existence, the Joint Programme has published 185 titles embracing non-metallic raw materials, their up-grading and refining ceramics and other non-metallic products, energy conservation and management, environmental problems and application of non-metallic sorbents in agriculture.

Of particular interest and relevance to the countries planning future industrial utilization of specific non-metallic raw materials are publications which in a comprehensive way present the whole material cycle for a given mineral from the geological prospection of raw material deposits through the various stages of mining and processing to the final integrated industrial application. The distribution of the Joint Programme publications is executed by the Joint Programme and UNIDO's Industrial and Technological Information Bank (INTIB) and so far more than 100 governmental bodies and industrial corporations have been served in this way. The following titles, which are among those most frequently requested, illustrate the broad range of topics:

- Profiles of Brick Plants
- Simple Ceramic Manufacturing Equipment
- Art of Composing Wall Tile Bodies
- Energy Conservation in Non-metallic Minerals Based Industries
- Production and Application of Non-metallics in Agriculture
- Hydrophobic Perlite - Liquidation of Oil Products
- Prospecting and Exploration of Non-metallic Mineral Raw Materials
- Kaolin and its Utilization
- Calculations in Ceramics
- Waste Heat
- Manufacture of Washed Kaolin for Paper Industry
- Ceramic Glass

- Manufacture of High Alumina Products
- Manufacture of Laboratory Porcelain
- Heat Diagnoses made on Tunnel Kiln and Belt Drier
- Perlite Industrial Exploitation
- Advances in Materials Technology - Ceramics
- Glass Production Technology in Developing Countries
- Bentonite Complex Industrial Exploitation
- Industrial Exploitation of Graphites
- Multi-lingual Ceramic Vocabulary
- Trouble-shooting in Operation of Ceramic Kilns
- Measuring System and Evaluation on Ceramic Kilns
- Role of Perlite in Environmental Protection

The complete list also includes 43 lectures on industrialization, energy management and exploitation of non-metallics delivered by the Joint Programme staff during missions and technical workshops.

Special Activities

Long-term co-operation with specialized organizations in developing countries in the form of technical information transfer, arrangements for training, trouble shooting in existing industries and technical assistance can be achieved through twinning arrangements with the UNIDO-CSSR Joint Programme or, through the Joint Programme, with relevant institutions in Czechoslovakia. In total, 48 institutions and corporations from developing countries have requested consultations and closer co-operation.

The energy conservation programme attempts to respond to the needs of developing countries in various ways inclduing specialized individual fellowship training, specialized technical workshops of which two have already been held and raw materials testing leading to the elaboration of technologies with a special view to energy conservation. Two missions to Brazil and India oriented to energy conservation and management have been organized and 29 publications, five specialized short films concerned with energy in ceramics and a mobile diagnostic unit used for energy audits have been elaborated.

The Joint Programme has exposed the possibilities for application of non-metallics in agriculture of developing countries. A publication on "Production and Application of Non-metallics in Agriculture" was issued in 1983 and, as a result a group of experts from Egypt visited the Joint Programme and Czechoslovak Ceramic Works to study the Czechoslovak experience in agricultural applications of non-metallics. Follow-up activities in Egypt and several other countries as well as an Ad-hoc Expert Group Meeting on Production and Application of Non-metallics in Agriculture are under preparation.

Mineral sorbents applied in agriculture to reduce wash-out of chemical matters and hydrophobic expanded perlite applied to clean oil-polluted water contribute to the environmental protection. The Joint Programme has so far issued three specialized publications on the matter. Further, one mission to Kuwait and Qatar took place in order to demonstrate the effectiveness of hydrophobic expanded perlite for oil absorbtion and during an International Conference in Iran devoted to this subject, the technology in question was presented to a larger audience.

CONCLUSIONS

The Joint Programme operates in accordance with a work programme which is defined once a year by a Joint Committee with participation from both the Czechoslovak authorities and UNIDO Headquarters. However, this work programme has sufficient built-in flexibility to permit the introduction of new specific activities during the course of the year and the Joint Programme is, therefore, able to respond promptly to requests from developing countries for assistance of the types outlined in this booklet. However, whereas requests for information or publications or even, in some cases, for raw material investigations, can be satisfied directly by the Joint Programme in consultation with UNIDO, more comprehensive assistance and especially such which required international travel needs to be requested through the established Government and UN channels in view of the need for external financing.

The validity of this dual approach to co-operation with interested developing countires has been amply demonstrated by the rapidly increasing number of requests received for the services of the Joint Programme and continuous efforts are being made to strengthen and streamline its organization to allow it to respond to the growing needs.

ANNEX I

REVIEW OF ACHIEVEMENTS

1. Twinning Arrangements

The UNIDO-Czechoslovakia Joint Programme has established a twinning arrangement with a specialized institution in Suriname in the form of co-operation aimed at transfer of know-how, publications, arrangements for training and trouble shooting in existing industries. Twinning arrangements with Guyana, India, Libya and Egypt are being negotiated. In total, more than 40 institutions and corporations from the developing and least developed countries have requested consultations and closer co-operation.

The Joint Programme has established similar co-operation with Czechoslovak scientific organizations, universities, institutes and specialized enterprises to facilitate and accelerate any possible assistance to the developing and least developed countries in training technicians, testing raw materials, recruiting high qualified specialists and transferring technical information. Significant Czechoslovak organizations agreed to co-operate in this field:

Československé keramické závody, Praha (Czechoslovak Ceramic Works), trust of 9 ceramic companies and 2 research and designing institutes:
- Research Institute for Ceramics, Refractories and Raw Materials, Pilsen
- Projecting and Designing Institute, Prague
- West Bohemian Ceramic Works, Horní Bříza
- Ceramic Works, Chlumčany
- - Ceramic and Glass Raw Materials, Sedlec at Karlovy Vary
- North Bohemian Ceramic Works, Most
- Calofrig, Borovany
- Ceramic Works, Rakovník
- Moravia Chamotte and Schistose Clays Works, V. Opatovice
- Ceramic Works, Poštorná
- Ceramic Works, Košice

Přerovské strojírny, Přerov (Přerov Machinery)

Český geologický úřad, Praha (Czech Geological Office)

Československá keramika, Praha (Czechoslovak Ceramics, Foreign Trade Corporation)

Pragoinvest, Praha (Foreign Trade Corporation)

Polytechna, Praha (Technical Corporation Agency)

Cementárny a vápenky, Praha (Trust of enterprises producing cement and lime)

Keramoprojekt, Trenčín

Geoindustria, Praha

Československá akademie věd, Praha (Czechoslovak Academy of Sciences)

Further scientific institutions, universities, specialized enterprises and important corporations have also collaborated with the Joint Programme.

2. Individual Training

Experts in ceramic technology, energy conservation and in the manufacture of different non-metallic minerals based products and research managers were granted training in the Joint Programme, in the Research Institute for Ceramics, Refractories and Raw Materials in Pilsen and in pertinent Czechoslovak institutions and corporations:

1980 - one specialist from Bulgaria trained in "Art of Making Ceramic Glazes Decorative and Matt for Wall Tiles" - 2-month training

1981 - one specialist from Cyprus trained in the manufacture and application of bentonite - 2-month training

1982 - four specialists from the People's Democratic Republic of Korea trained in the manufacture of stoneware pipes and melted basalt - 2-month training

- one specialist from Kenya trained in the application of non-metallic raw materials - 2-month training
- one specialist from Brazil trained in new methods of energy conservation and management - 2-month training

1983 - one specialist from Brazil trained in energy conservation in ceramic industries - 6-week training

- two specialists from Guyana trained especially in the construction of rotary kilns and driers, production of refractories and in laboratory testing methods - 2-month training
- one specialist from Guyana trained in upgrading methods of non-metallic raw materials - 6-week training
- three specialists from Suriname trained in energy conservation and management - 3-week training

1984 - five scientists from Egypt trained in the use of bentonite in agriculture on 1 week training.

All the trainees had possibilities of consultations in production plants, specialized laboratories, technical schools, technical libraries of Czechoslovakia which could contribute to their training according to the training programmes adjusted to their occupations and special interests. The trainees elaborated final reports which regarded their training as satisfactory, especially, they pointed out the fact that they had been enabled to get acquainted in practice with any non-metallic raw material based production starting with extraction, production and ending with final application. In addition to it, they could see small scale production and also large automated plants during their short stay in Czechoslovakia. This was possible owing to the extraordinary concentration of silicate industries in West Bohemia whose centre is Pilsen.

3. Group Training

Before the Joint Programme was established, the In-plant Technical Workshop on the Production of Refractories, had been organized. The Technical Workshop on the Exploitation and Beneficiation of Non-metallic Minerals, Technical Workshop on Energy Conservation in Silicate Industries for the Least Developed Countries, Meeting on the Properties of Coating Kaolins and In-plant Technical Workshop on Energy Conservation and Management in Ceramic Industries were arranged by the Joint Programme hitting managerial issues of silicate and, if need be, non-metallic raw materials related industries, such as paper production. Participants were top governmental and corporation officials, experts and technicians from the developing and least developed countries.

The programme aimed at technological questions following the line from the extraction to the manufacture and final applications of non-metallics and a special attention was paid to the conservation and management of energies in the silicate industries. The last In-plant Technical Workshop on Energy Conservation and Management in Ceramic Industries was a consequence of the previous Technical Workshop on Energy Conservation in Silicate Industries as it had been required and recommended by the participants of the latter.

The group training was scheduled to provide for theoretical information delivered by top Czechoslovak and foreign experts and practical training in the institutes and corporations of Czechoslovak silicate industries. The horizontal discussions among participants from different countries on questions related to their industrial problems were regarded as a great contribution to solving them.

Some details on particular workshops are given below:

1980 - Technical Workshop on the Exploitation and Beneficiation of Non-metallic Minerals
/April 8 - 26/

- 15 participants from Botswana, Colombia, Cyprus, Egypt, Ethiopia, Ghana, India, Iran, Jordan, Nigeria, Suriname, Tanzania, Thailand, Turkey
- 14 lectures, 10 delivered by Czechoslovak experts and the other four by lecturers from Hungary, Great Britain, Austria and UNIDO Vienna
- Participants appreciated the Workshop as a very successful one and demanded its repetition on a larger extent and technical assistance of the Joint Programme in accelerating establishment of industries, training technicians, testing raw materials, short term expertise assistance, implementing energy measurements appliances and specialized laboratories and in providing with know-hows.

1981 - Technical Workshop on Energy Conservation in Silicate Industries for the Least Developed Countries
/October 5 - 16/

- 15 participants from Afghanistan, Bangladesh, Nepal, Somalia, Sudan, Tanzania and People's Democratic Republic of Yemen
- 11 lectures delivered by international experts, Czechoslovak science and research directors, university professors and factory senior technicians
- The programme was concentrated on three most energy intensive silicate industries - ceramics, glass and cement production

- The participants appreciated the workshop and demanded that the Joint Programme should go on in its activities and assist the least developed countries in energy conservation which had become a crucial issue of any further industrial development. They recommended the next technical workshop to be centered on energy conservation and management in ceramic industries only.

1981 - Meeting on the Properties of Coating Kaolin
/July 20 - 21/

It was arranged by the Joint Programme in the presence of Mr. M. Judt, UNIDO expert, and Czechoslovak specialists. The meeting contributed to clearing the existing problems in this area.

1983 - In-plant Technical Workshop on Energy Conservation and Management in Ceramic Industries for the Least Developed and Developing Countries
/April 11 - 29/

- 12 participants from Bangladesh, Ethiopia, Guinea-Bissau, Nepal, Sudan, Tanzania, People's Democratic Republic of Yemen
- 6 participants from Brazil, Guyana and Suriname
- 12 lectures delivered by international experts, industry and research directors, university professors and scholars
- The appreciation by participants, UNIDO representatives and Czechoslovak authorities of the technical level and organization was very positive.

4. Testing of Raw Materials

Testing of non-metallic raw materials from developing and least developed countries and the related activities such as geological survey, technological research, industrial verification, economic evaluation for decision making, elaboration of manufacturing technologies and their transfer, have represented a very important part of the technical assistance extended to these countries by the Joint Programme since its establishment.

The products based on non-metallic minerals are nowadays applied in heavy and light industries and to a great extent in the construction industry being thus indispensable for the balanced development of every national economy. The development of non-metallics based industries is one of the priorities in all the developing and least developed countries.

50 reports based on raw material tests, which has proceeded economically in dependence on the forthcoming or accomplished stages of pre-investment activities, have been elaborated. The preliminary, laboratory and pilot tests have involved the technological research and proposals of technologies. Many countries have made use of it:

Antigua, China, Costa Rica, Cyprus, Egypt, Ethiopia, Fiji,
Grenada Guyana, Jordan, Kuwait - Qatar, Libya, Nigeria,
Papua New Guinea, Seychelles, Suriname, Tanzania, Uganda
Zaire, Zimbabwe.

Specific instruction for developing countries regarding the testing of raw materials was published and distributed by the Joint Programme Bulletin no. 4 in 1982.

5. Technical Assistance, Advisory and Exploratory Missions

The Joint Programme taking advantage of the wide know-how of Czechoslovak ceramic industries has extended the direct assistance to the developing and least developed countries in all phases of decision process and in all stages of industrial exploitation of non-metallic raw materials. Participating in the UNIDO projects, the experts of the Joint Programme have visited many countries and assisted the governmental authorities and industrial corporations. In addition, the Joint Programme has mediated the access to know-how publishing on ceramic technologies, energy conservation and other technical issues related to industrial operations. 57 project proposals have been elaborated concerning technical assistance and submitted to relevant authorities.

a) Missions

Advisory missions were undertaken to the People's Republic of China, Syria and Libya in 1979 - 1980

in 1981 - advisory mission to Suriname oriented to the establishment of exploitation, beneficiation and processing of kaolin

in 1982 - exploratory mission to the Philippines for cottage small and medium size ceramic and glass industries

- advisory mission to Turkey concerning technical assistance to ceramic industry and application of diagnostic mobile unit, 3 lectures delivered on the occasion of 25th anniversary of the establishment of ceramic industry in Turkey

- advisory mission to Guyana oriented to formulating future co-operation in the field of non-metallic industries
- advisory mission to Suriname oriented to the evaluation of local non-metallic raw materials and follow-up actions
- advisory mission to Suriname to elaborate feasibility study on the establishment of ceramic wall and floor tile plant
- advisory mission to Libya concerning the industrial exploitation of local non-metallic raw materials

in 1983
- advisory mission to Zimbabwe geared to the expansion and diversification of ceramic industries and to the exploitation of non-metallic raw materials
- mission to Seychelles for technical assistance in the establishment of ceramic and heavy clay industries; geological prospection, pre-feasibility study and evaluation of suitability of raw materials
- mission to Middle East (Kuwait and Qatar) oriented to the liquidation of petroleum pollution of Persia Gulf
- mission to Brazil oriented to briefing on new diagnostic energy auditing methods and utilization of waste heat in ceramic industry
- mission to Libya for extension of ceramic industries
- mission to India for assistance in energy conservation in ceramic industries

b) Transfer of Know-how

During its existence, the Joint Programme has published 178 titles encompasing questions of energy conservation, preparation of decisions, research and testing of non-metallics, descriptions of industrial processes, ceramic vocabulary, bulletins, etc. (The cummulative list of Joint Programme publications is presented in Annex II).

Two main groups of publications deal with energy conservation and research activities respectively. The developing and least developed countries have appreciated the special approach in conducting series of publications. While all world publications are related specifically to particular industrial operations, such as raw material extraction, processing and application, the new Joint Programme approach is based on the information on individual minerals or rocks necessary for commercial and industrial application in developing countries, such as diatomaceous earth, clays, kaolins, etc. The new publication "Application of Non-metallic Minerals in Agriculture" was a result of this approach.

Apart from this title, the most required publications read inter alia as follows: Simple Ceramic Manufacturing Equipment, Art of Composing Wall Tile Bodies, set of publications dealing with energy conservation, Profiles of Brick Plants, Ceramic Vocabulary - Czech, English, German Version (Russian, French and Spanish version under preparation), Prospecting and Exploration of Non-metallic Mineral Raw Materials,Calculations in Ceramics, Waste Heat, Kaolin and Its Utilization, Manufacture of Washed Kaolin for Paper Industry.

Informative bulletins and booklets issued periodically and informing of the Joint Programme activities should be mentioned because they have evoked correspondence on technical matters between the Joint Programme and institutions in the developing and least developed countries. Requests for advising in the selection of most modern ceramic equipment and production methods, in research and testing methods, laboratory specialized equipment, different quality standards and other questions were answered by the Joint Programme.

Forty three lectures on industrialization and exploitation of non-metallics in the developing and least developed countries have been delivered by the Joint Programme staff during workshops, meetings, missions to the developing and least developed countries and other occasions to the concerned from the developing and least developed countries. All of them are filed in the Joint Programme archives and are for disposal to other countries.

6. Energy Conservation Programme

Energy conservation programme has fully responded to the needs of the developing and least developed countries. Based on the high level of energy conservation system in non-metallics in Czechoslovakia, the Joint Programme has extended various services to the developing and least developed countries providing individual and group training, elaborating energy saving ceramic technologies based on local raw materials, providing technical assistance during missions and publishing and lecturing on energy conservation and management. The assistance in energy conservation and management has covered six main spheres:

- non-traditional technologies with reduced energy intensity, such as the application of non-traditional raw materials as fluxes in body composition of ceramic products, the introduction of one-fire technology in firing walling products and the fast firing of various ceramic products
- optimization of thermal processes with regard to limiting conditions represented by acceptable temperature progress which is not detrimental to the quality of ceramic products and applicable in the manufacture of all ceramic products
- energy diagnostics of thermal equipment by means of energy and technological measurements (Mobile Diagnostic Unit)
- thermal equipment and its updating - involves repairs and improvements aimed at energy savings feasible by plant workshops and innovations, such as installment of more effective kiln furners and implementation of remedial measures recommended after diagnostic evaluation
- use of secondary heat resources involves the utilization of waste heat as from the kiln cooling zone, hot air outlet from driers and combustion products before the stack

f) mobile diagnostic unit

The backing Research Institute for Ceramics, Refractories and Raw Materials is in possession of three mobile diagnostic units which are prepared to conduct energy measurements in the developing and least developed countries. Relevant offers regarding implementation were elaborated and submitted which have not yet been exploited by the developing countries. This equipment has been, however, fully utilized for the purposes of individual and group training programmes. The implementation of the mobile diagnostic unit has always resulted into energy conservation, quality improvement of final products and higher outputs of driers and kilns.

7. Non-metallics in Agriculture

The Joint Programme has developed possibilities of the application of non-metallics in agriculture of the developing and least developed countries. The scientific efforts and practical experiments concerned with increasing agricultural output of soils in recent years have proved excellent properties of non-metallic minerals and rocks as bentonites, zeolites, tuffs and others when applied to soils as sorbents. The presence of sorbents in soils is regarded as important as photosynthesis for plant growing and their application to deficite soils increases the agricultural output. Sorbents added to fodder bring about the increased output of husbandry, too.

This issue is so important that a special Ad Hoc Expert Group Meeting "Production and Application of Non-metallics in Agriculture" is under preparation (Aide Memoire and Project Proposal submitted) to take place in Vienna and Czechoslovakia in 1985. The publication on "Production and Application of Non-metallics in Agriculture" by a team of authors came out in 1983. The Joint Programme iniciated the project proposal on soil reclamation by sorbents in Ethiopia which was submitted to UNIDO. Other projects are under consideration. Two groups of experts, one from the People's Republic of China in 1983 and the other from Egypt in January 1984 visited the Joint Programme and Czechoslovak Ceramic Works to study Czechoslovak experience in agriculture applications of non-metallics.

8. Non-metallics to Protect Environment

An important incidental circumstance of agricultural application of non-metallics is their positive influence on lowering the penetration of fertilizers and chemicals detrimental to the health into subsoil waters. The most valuable property of hydrophobic perlite to adsorb non-polar liquids and to repel water has been advantageously utilized in remedying petroleum polluted water reservoirs.

UNIDO special mission together with 3 Czechoslovak experts whose participation was financed by the Czechoslovak Authorities to Middle East geared to the solution of cataclysmatic situation of Arabian Gulf took place in 1983. Czechoslovak hydrophobic perlite was tested and evaluated very good filtering material because its utilization in filters in desalination plants made possible to use the water from the polluted sea. Other countries jeopardized by oil products pollution requested for assistance. The conclusions and recommendations were submitted to UNIDO considerations and implementations. Samples of Czechoslovak hydrophobic perlites were handed over, free of charge, to UNIDO for further testing on the spot. A follow-up of this project is necessary to be elaborated and further development followed to accelerate the suggested assistance.

9. African Industrial Development Decade

The Joint Programme has been expected to play a significant role in the African Industrial Development Decade due to the importance which is attached to the development of building materials industries. The Joint Programme has assisted to one third of African countries:

- Individual Training

One engineer from Kenya trained in the application of non-metallics;

Five scientists from Egypt trained in the application of bentonite in agriculture.

- Group Training

Participants from Botswana, Egypt, Ethiopia, Ghana, Guinea-Bissau, Nigeria, Somalia, Sudan and Tanzania took part in technical workshops organized by the Joint Programme.

- Raw Material Testing

Tests, analyses and technological evaluations of raw materials were carried out which were delivered from Egypt, Ethiopia, Libya, Nigeria, Seychelles, Tanzania, Uganda and Zaire.

- Technical Assistance

Missions were undertaken to Libya, Seychelles and Zimbabwe. Project proposals were elaborated to assist other African countries in ceramics, building materials and industrial and agricultural exploitation of non-metallics. Many African countries were sent technical publications, papers and advice on their special request, e.g. Mozambique on firing processes in the sanitary ware manufacture.

ANNEX II

C U M M U L A T I V E L I S T
OF THE UNIDO-CSSR JOINT PROGRAMME PUBLICATIONS
FOR THE PERIOD
1 October 1978 to 31 December 1983

JP/1/78	Clay Samples from the Caribbean Area - Technological Evaluation /Restricted/
JP/2/78	Questionnaire
JP/3/78	Ceramic Raw Material Testing Specification Sheet and Tentative Costs of Testing /Restricted/
JP/4/78	Clay Samples from the Caribbean Area /Restricted/
JP/5/78	Establishment of a Ceramic Pilot Plant in Botswana - Reduced Production Programme - Assessment of Feasibility /Restricted/
JP/6/78	Energy Saving Possibilities in Non-metallic Minerals Based Industries at Present and in the Long Run
JP/7/78	The Past-, Present-, Future Trend of Energy Savings in the Non-metallic Minerals Based Industry
JP/8/78	Clay Samples from Papua New Guinea - Technological Evaluation /Restricted/
JP/9/78	Kaolin and Its Utilization
JP/10/78	Energy Conservation in Non-metallics (Mobile Diagnostic Unit)
JP/11/78	Bentonite - Binding Clay
JP/12/78	Silica - Silica Raw Materials for Refractories, Ceramics, Glass and Building Materials
JP/13/78	Present-day Problems of Utilization of Gypsum Rock and Gypsum Plaster in the Building Industry
JP/14/78	Other Non-metallic Raw Materials
JP/15/78	Commercial Exploitation of Clays
JP/16/78	Dressing of Non-metallic Raw Materials
JP/17/78	Profiles of Brick Plants

JP/18/79	Geological Prospection and Exploration for Non-metallic Mineral Raw Materials
JP/19/79	Technological, Physical and Chemical Testing of Non-metallic Raw Materials
JP/20/79	Raw Materials from Suriname - Part I Technological Evaluation of Clay Samples /Restricted/
JP/21/79	Non-metallic Raw Materials - Source of Energy Conservation
JP/22/79	Brief Information on Micanite Manufacture, Properties and Use
JP/23/80	Field Operation of Mobile Diagnostic Unit /Restricted/
JP/24/80	Booklet 1979
JP/25/80	Booklet 1979 - Czech translation
JP/26/80	Anhydrous Sodium Sulphate Manufacture
JP/27/80	Energy Conservation in Non-metallic Minerals Based Industries
JP/28/80	Borosilicate Glass Tube Manufacture - Brief Information
JP/29/80	In-plant Training Guide - Kaolin, Clay, Feldspar and Diatomaceous Earth Deposits, Plant Visits and Sightseeing
JP/30/80	Exploitation and Beneficiation of Perlite - Perlite and Its Industrial Uses
JP/31/80	The Evaluation and Specification of Rock Deposits for Building Material Production: Limestones and Natural Pozzolanas
JP/32/80	Brief Description of Manufacturing Technology of Liquid Gold for the Decoration of Glass, China Ware and Ceramics
JP/33/80	Energy Conservation - Brief Information
JP/34/80	Survey of Values Applied in Energy Measurements (Mobile Diagnostic Unit) /Restricted/
JP/35/80	Recent Advances in Crude Oil Saving Systems in Petrochemical Industry
JP/36/80	In-plant Training Workshop on the Exploitation and Beneficiation of Non-metallic Minerals - Schedule

JP/37/80 In-plant Training Workshop on the Exploitation and Beneficiation of Non-metallic Minerals - Brief Information on Visited Plants

JP/38/80 In-plant Training Workshop on the Exploitation and Beneficiation of Non-metallic Minerals - Daily Reports

JP/39/80 In-plant Training Workshop on the Exploitation and Beneficiation of Non-metallic Minerals - Programme

JP/40/80 In-plant Training Workshop on the Exploitation and Beneficiation of Non-metallic Minerals - Conclusions and Recommendations /Restricted/

JP/41/80 In-plant Training Workshop on the Exploitation and Beneficiation of Non-metallic Minerals- Country Reports /Restricted/

JP/42/80 In-plant Training Workshop on the Exploitation and Beneficiation of Non-metallic Minerals - Final Report

JP/43/80 In-plant Training Workshop on the Exploitation and Beneficiation of Non-metallic Minerals - Final Report - Czech translation

JP/44/80 In-plant Training Workshop on the Exploitation and Beneficiation of Non-metallic Minerals - Final Report - Appendixes /Restricted/

JP/45/80 Raw Materials from Suriname - Technological Evaluation of Clay, Kaolin and Silica Sand Samples /Restricted/

JP/46/80 Simulating of Thermal Processes in Silicate Industries

JP/47/80 Decorating Colours for Glass, Ceramics and China Ware

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JP/50/80 UNIDO Energy Task Force - UNIDO-CSSR Joint Programme Organization /Restricted/

JP/51/80 Review of the Joint Programme Publication for the Period - 1978 - VII/80

JP/52/80	Heat Consuming Units in Cement Industry
JP/53/80	Internal Script for Scientific Seminar UNESCO GEO - Nonmetallic 1979
JP/54/80	World Energy Problem
JP/55/80	Heat Consuming Units in Ceramic Industry
JP/56/80	Volcanic Rocks - Applied as Fluxes in Ceramic Manufacture
JP/57/80	Basalt Rocks
JP/58/80	Specification of Limestone and Kaolin Properties for Their Use as Fillers for Plastics
JP/59/80	Review of Publications
JP/60/80	Manufacture of Washed Kaolin for Paper Industry
JP/61/80	Equipment for Laboratory Testing of Kaolin, Clays and Sands
JP/62/80	Booklet 1980
JP/63/80	Booklet 1980 - Czech translation
JP/64/80	Liaison between the UNIDO Headquarters and the UNIDO-CSSR Joint Programme - Report /Restricted/
JP/65/80	Final Report on the Fellowship Training - Mrs. E. A. Stanulova, Bulgaria /Restricted/
JP/66/80	cancelled
JP/67/80	cancelled
JP/68/80	Simple Ceramic Manufacturing Equipment
JP/69/80	Low Cost Housing Industries
JP/70/80	Annual Report 1980 /Restricted/
JP/71/80	Annual Report 1980 - Czech translation /Restricted/
JP/72/81	Ceramic Processing Operations
JP/73/81	Final Report - Establishment of Small Scale Industries, Testing and Evaluation of Clay Samples from Zaire /Restricted/

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JP/76/81	Technological Tests of Suriname Kaolins /Restricted/
JP/77/81	Bulletin No. 2
JP/78/81	Non-traditional Ceramic Raw Materials Enabling Savings in Energy
JP/79/81	Non-traditional Ceramic Raw Materials Enabling Savings in Energy - Czech translation
JP/80/81	Non-traditional Raw Materials, Source of Energy Conservation
JP/81/81	Testing Institute and Plant Laboratories for Testing Non-metallic Raw Materials and Products
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JP/88/81	Diagnostics
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JP/90/81	Recent Advances in Crude Oil Saving Systems in Petrochemical Industry
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JP/100/81	Evaluation of Cyprus Bentonite for Wall Tile Manufacture /Restricted/
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JP/118/82	Bulletin No. 5
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JP/120/82	Vocabulary for Ceramic Industry and Non-metallic Raw Materials
JP/121/82	Review of Activities of the Joint Programme for the first half-year 1982
JP/122/82	Mining and Dressing of Kaolin in the CSSR
JP/123/82	Sanitary Ware Manufacture (Techno-economical information)
JP/124/82	Czechoslovak Ceramic Works - Development and Energy Conservation
JP/125/82	Non-metallics - their Contribution to Energy Conservation
JP/126/82	Energy Management in a Ceramic Plant
JP/127/82	Energy and Material Flows in the Manufacture of Selected Ceramic Products
JP/128/82	Energy Savings in Composing Ceramic Bodies
JP/129/82	Calculations in Ceramics
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JP/133/82	Waste Heat
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JP/145/82	Terminal Report - Libya /Restricted/
JP/146/82	Terminal Report - Suriname /Restricted/
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JP/159/83	Summary of Semi-annual Report 1983 /Restricted/
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JP/161/83	Terminal Report - Brazil /Restricted/
JP/162/83	Final Report on Fellowship Training - Mr. A. Ramwa, Guyana /Restricted/
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